

**PRICING OF NATURAL GAS IN INDIA**

**Submitted by:** Harsh Kanani

**Date:** 14<sup>th</sup> January 2011

## **List of Contents**

<b>Current Scenario of Natural Gas in India</b>	<b>3</b>
Consumption View	3
Demand Forecasts for India	4
<b>Regulatory Framework for Natural Gas</b>	<b>4</b>
Pricing and Allocation of Upstream and Midstream Gas	4
Regulations for Pricing Downstream Gas	6
<b>Current Pricing Mechanism in India</b>	<b>6</b>
APM Gas Pricing	7
Pricing of Gas under Pre-NELP Production Sharing Contracts (PSC)	8
Pricing of Gas with reference to NELP Provisions	8
Import Gas (LNG) Pricing	8
<b>Pricing Issues</b>	<b>10</b>
Supply Side Issues	11
Demand Side Issues	11
Road Ahead	11
<b>Framework of New Pool Pricing Mechanism</b>	<b>12</b>
Need for Pool Pricing	12
Proposed Roadmap of Pool Pricing Mechanism	13
<b>Conclusion</b>	<b>15</b>
<b>References</b>	<b>17</b>

## **List of Tables**

<b>Table 1:</b> Natural Gas Consumption in India	<b>3</b>
<b>Table 2:</b> Natural Gas Demand Projection	<b>4</b>
<b>Table 3:</b> Summary of Prices prevailing in India	<b>9</b>
<b>Table 4:</b> Gas Price Differentiation in Indian Market (2010)	<b>10</b>

## **List of Figures**

<b>Figure 1:</b> Pool Price at Various LNG Prices for 5 MMTPA New Supply	<b>13</b>
<b>Figure 2:</b> Pooling Options in India	<b>14</b>

## Current Scenario of Natural Gas in India

India is the world's seventh largest energy producer, accounting for 2.49% of the world's total annual energy production. It is the fifth largest energy consumer, accounting for about 3.45% of total energy consumption in 2004, which has been increasing by an average of 4.8% percent a year since 1990. The share of commercial energy in total primary energy consumption increased from 59.7% in 1980-81 to 79.3% in 2008-09. India's GDP has grown at more than 8-8.5% during the last few years, and is expected to grow minimum at the rate of 7.5-9% in the coming few years. The growth has taken place despite the huge deficit in energy infrastructure and infrastructure. Even today, half of the country's population does not have access to electricity or any other form of commercial energy, and still use non-commercial fuels such as firewood, crop residues end during cakes as a primary source of energy for cooking in over two-thirds of households.

## Consumption View

Natural gas has emerged as the most preferred fuel due to its inherent environmentally benign nature, greater efficiency and cost effectiveness. According to the Ministry of Petroleum and Natural Gas, gas use in India amounted to 59 billion cubic meters in FY 2009/10, up from 43 billion cubic meters in FY 2008/09; energy use amounted to 61% compared to 39% used for non-energy purposes (see Table 1). Before the start of Krishna-Godavari in April 2009, consumption was supply constrained and demand for gas could easily have been 30 billion cubic meters higher. Indeed, it is important to make a clear distinction between potential demand and actual consumption as these numbers widely differ. In 2007, unmet demand was estimated at 35 billion cubic meters.

**Table 1: Natural Gas Consumption in India**

	2004/05	2005/06	2006/07	2007/08	2008/09
<b>Energy purposes</b>					
Power generation	12 099	11 878	11 963	12 037	12 603
Industrial fuel	3 569	3 780	3 205	3 324	5 912
Tea plantation	142	151	170	160	154
Domestic fuel	343	75	443	39	102
Captive use/LPG shrinkage	4 944	5 048	5 034	5 618	5 706
Others	231	1 120	40	1258	1535
<b>Non-energy purposes</b>					
Fertiliser	8 173	7 762	8 497	9 822	9 082
Petro-chemicals	1 236	1 175	1 377	1 432	1 105
Others	38	36	639	638	6 761
<b>TOTAL</b>	<b>30 775</b>	<b>31 025</b>	<b>31 368</b>	<b>34 328</b>	<b>42 960</b>

(Source: Ministry of Petroleum and Natural Gas in India)

## **Demand and Forecasts for India**

The demand of natural gas has sharply increased in the last two decades at the global level. In India natural gas was first discovered off the west coast in 1970s, and today, it constitutes 10% of India’s total energy consumption. Over the last decade it has gained importance as a source of energy and its share is slated to increase to about 25% of the total energy basket by 2025-2030. In its Reference Scenario, the IEA expects Indian gas demand to increase to 94 billion cubic meters by 2020 and to 132 billion cubic meters by 2030, driven by the industrial and power generation sectors. This means an annual increase of 5.4% – one of the highest in the world. In the 450 Scenario, demand by 2020 would be slightly lower (89 billion cubic meters), but by 2030 would almost remain at the same level as in the Reference Scenario – 132 billion cubic meters – as gas would be needed to displace coal. The latest available Indian demand forecasts for the 11<sup>th</sup> Five-year plan (2007-12) show gas demand increasing by between 37% and 58% over that period and the power sector being the main driver for incremental gas demand (see Table 2).

**Table 2: Natural Gas Demand Projection**

Sector	2007/08	2008/09	2009/10	2010/11	2011/12	
	I	I	I	I	I	II
Power	29.2	33.2	37.6	41.6	46.4	32.5
Fertiliser	15.0	15.7	19.0	28.8	28.8	28.8
City Gas/Industrial	9.9	10.6	11.3	12.4	13.1	13.1
Sponge Iron	2.2	2.2	2.6	2.6	2.9	2.9
Other (Petrochem/ Refinery/Internal Consumption)	9.1	9.9	10.6	11.3	12.0	12.0
<b>Total (Mcm/d)</b>	<b>179</b>	<b>196</b>	<b>222</b>	<b>265</b>	<b>283</b>	<b>245</b>
<b>Total (bcm)</b>	<b>65</b>	<b>72</b>	<b>81</b>	<b>97</b>	<b>103</b>	<b>89</b>

(Source: India Oil and Gas)

## **Regulatory Framework for Natural Gas**

### **Pricing and Allocation of Upstream and Midstream Gas**

Natural gas is a scarce resource in India and Govt. of India plays an important role in its allocation. Historically, gas has been allocated in priority to end-users such as fertiliser producers and power plants. In 2007, the Govt. of India started working on a new Gas Utilisation Policy. This was mostly a consequence of the dispute between the Ambani brothers and the related issues on gas pricing and utilisation, which created a very hot debate in India. In 2007, a price was agreed between RIL and the government under the PSC so that RIL was to sell gas at USD 4.2/ Million British thermal units for the first five years of production.

This price level, often reported, reflects the calculation under a formula linking the price of gas to the price of oil:

$$GP = 2.5 + (OP - 25)^{0.15}$$

Where, OP is the annual average Brent crude price for the previous FY, with a cap of USD 60/bbl and a floor of USD 25/bbl. Since 2007, the annual Brent price has always been above USD 60.

This and the large gap between demand and available supplies prompted the government to develop a Gas Utilisation Policy and to go back to administrative control over prices (Govt. of India introduced a price formula for all discoveries under the first six NELP rounds) and over volumes to be allocated to end-consumers. Therefore, in 2008, the government introduced Natural Gas in India new guidelines called the Gas Utilisation Policy, which effectively took away gas producers' rights to sell the gas they discover on the open market. These guidelines would be applicable for the next five years and be reviewed afterwards. The recent ruling of the Supreme Court in May 2010 regarding the dispute between RIL (Reliance Industries Ltd.) and RNRL (Reliance Natural Resources Ltd.), reaffirms the role of the government in the allocation and pricing of gas. Currently, the rules of the General Policy for the gas market imply that gas will be allocated according to industry-wise priorities set up by the government. This does not imply that the gas is “reserved”: if one customer is not in a position to take the gas, the next one on the list becomes eligible. Existing users have priority over Greenfield users. The gas is allocated as follows:

**For Existing customers:**

- Fertiliser producers
- LPG and petrochemicals
- Power plants
- City Gas Distribution (CGD)
- Refineries
- Others.

**For Greenfield users, the priorities are:**

- Fertiliser producers
- Petrochemicals
- CGD
- Refineries
- Power plants.

The above lists clearly show the preference for fertiliser producers, petrochemicals and power plants as first category customers. CGD usually comes in second position. Govt. of India gave priority to power generators and fertiliser producers, making them the major customers supplied at the lowest rate (Administered Pricing Mechanism prices decided by the government) by the state-owned oil and gas companies. Industrial users, which are interested in switching to gas, do not have access to low-priced gas resources and have to pay higher prices to private companies

and LNG importers. This makes sense when gas is more economical than the fuel they use (for example naphtha). This situation has changed with the increase of APM (Administered Pricing Mechanism) prices to USD 4.2/ Million British thermal units in May 2010.

## **Regulations for Pricing Downstream Gas**

Historically, gas markets were entirely serviced by PSU with prices determined by the central government. From 1987 to 2005, production and transport prices were fixed by the Empowered Group of Ministers (EoGM). The APM mechanism for oil was formally phased out in 2002, but most of the gas produced by ONGC and OIL and distributed by GAIL continues to be sold at APM prices. In 2006, the regulator PNGRB was created to set up the bases for a competitive market and has been developing regulations since then.

In the transmission sector, Govt. of India wishes to develop a policy concerning the approval of pipeline construction that would be consistent, market-friendly, and would help avoid duplication of gas transport routes. In December 2006, the monopoly on transmission networks for GAIL was abolished enabling other companies to build and operate networks. The regulator PNGRB set up the Access Code requiring third-party access for one third of the capacity and setting the tariffs of transportation for third parties. PNGRB has therefore to determine tariffs for existing pipelines as well as for pipelines authorised by the government (before PNGRB was created). Typically, transport along the Hazira-Bijaipur-Jagdishpur pipeline costs USD 0.58/Million British thermal units; GAIL proposed to charge USD 0.88/MBtu for its 572 km-long Dahej-Uran-Panvel pipeline. For its 1400 km-long East-West pipeline (EWPL), RGTIL (Reliance Gas Transportation Infrastructure Ltd.) opted for a two-zone tariff and wanted to charge USD 0.3-0.4/MBtu for the first zone and USD 1.25/MBtu for the second zone.

## **Current Pricing Mechanism in India**

The natural gas pricing scenario in India is complex and heterogeneous in nature. There are wide varieties of gas price in the country. At present, there are broadly two pricing regimes for gas in the country - gas priced under APM and non-APM or free market gas. The price of APM gas is set by the Government. As regards non-APM/free market gas, this could also be broadly divided into two categories, namely, domestically produced gas from JV fields and imported LNG. The pricing of JV gas is governed in terms of the PSC (Production Sharing Contract) provisions. It is expected that substantial gas production would commence from the gas fields awarded by the Government under the New Exploration Licensing Policy (NELP). As regards LNG, while the price of LNG imported under term contracts is governed by the SPA (Special Purchase Agreement) between the LNG seller and the buyer, the spot cargoes are purchased on mutually agreeable commercial terms.

## 1. APM (Administered Pricing Mechanism) Gas Pricing

APM gas refers to gas produced by entities awarded gas fields prior to the PSC regime. The prices of gas from these fields are administered by Govt. of India. In 2005, the price of APM gas of ONGC and OIL was revised. Based on recommendations of the Tariff Commission, the Cabinet Committee on Economic Affairs decided that APM gas prices would be increased. All available APM gas would be dedicated to power generators, fertilisers as well as specific end users covered by Court orders and small-scale consumers having allocations up to 0.05 MCM/day. At that time, ONGC and OIL produced about 55 MCM/day APM gas from nominated fields. The Government raised the consumer price be revised from Rs. 2,800/MSCM to Rs. 3,200/MSCM with effective from July 1st 2005 for the following categories of consumers. It was also decided that all the APM gas will be supplied to only these categories.

- Power sector consumers
- Fertilizers sector consumers
- Consumers covered under court orders
- Consumers having allocations of less than 0.05 MMSCMD

This increase was on an ad hoc basis and it was decided that the Tariff Commission would examine the issue of producer price of natural gas. The Tariff Commission (TC) has since submitted its report and has recommended Producer price of Rs.3710/MSCM and Rs.4150/MSCM for ONGC and OIL respectively. TC has also recommended that the consumer price should be somewhat higher than the producer price, considering the substantial difference between the recommended producer price and the price of market gas/alternative fuels. Govt. of India also decided that the price of gas supplied to small consumers and transport sector (CNG) would be increased over the next 3 to 5 years to the level of the market price. With effect from May 6th 2005, the APM gas price to small consumers and CNG sector has been increased by 20% to bring it to Rs.3840 / MSCM.

The price of natural gas for customers in the North-East has been kept at 60% of the price in the rest of the country. Accordingly, the price for power and fertilizers sector in the North-East is Rs.1920/MSCM and that for court-mandated and small scale consumers in the region is Rs.2304/MSCM.

APM gas prices for the transport sector (CNG), small industries and consumers would be progressively increased from INR 3 200/1 000m<sup>3</sup> (USD 1.79/MBtu) over the following years to reflect the market price. As they became the second category after fertilisers and power producers, small users/CNG saw prices increasing from INR 3 200/1000m<sup>3</sup> (USD 1.79/MBtu) to INR 3 840/1 000m<sup>3</sup> (USD 2.15/MBtu) in 2006 (INR 2 304/1 000m<sup>3</sup> in the North East).

## **2. Pricing of Gas under Pre-NELP Production Sharing Contracts (PSC)**

Production Sharing Contracts (PSCs) were executed by GOI with Ravva consortium and PMT (Panna Mukta Tapti) consortium on October 28, 1994 and December 12, 1994 respectively. The price of natural gas is determined by the provisions of PSC signed by the consortium with GOI. Around 17.3 MMSCMD, 1 MMSCMD and 0.9 MMSCMD are supplied from PMT fields, Ravva fields and Ravva Satellite fields respectively under the pre-NELP PSCs. Out of this, GAIL supplies 5 MMSCMD from PMT fields and the production (1 MMSCMD) from Ravva fields at APM rate to APM consumers; the difference between PSC price and APM price is being made up through the gas pool account mechanism.

## **3. Pricing of Gas with reference to NELP Provisions**

As regards the gas from NELP fields, the Government constituted an Empowered Group of Ministers to consider inter alia issues relating to pricing of natural gas, produced under the NELP regime. It has been decided therein that the provisions of the NELP PSC should be honoured. The following price basis/formula for the purpose of valuation of natural gas has been approved by the Government in case of KG-D6 Block of RIL/Niko.

Selling price (in US \$/MMBTU) = 2.5 + (CP-25)0.15 (in US\$/MMBTU),

where CP=crude price in US\$/barrel, with cap of CP=US \$60/barrel. The price basis/formula comes to US\$4.2/MMBTU for crude price greater or equal to US \$60/barrel. It was decided that price discovery process on arm's length basis will be adopted in the future NELP contracts, only after the approval of the price basis/formula by the Government.

## **4. Import Gas (LNG) Pricing**

A contract was signed with RasGas, Qatar for supply of 5 MMTPA LNG (equivalent to about 18 MMSCMD) by Petronet LNG Limited (PLL) and supplies commenced from April 2004. This quantity has subsequently increased to 7.5 MMTPA effective from January 2010. The price for LNG has been linked to JCC crude oil under an agreed formula. However, the FOB price for the period up to December 2008 has been agreed at a constant price of \$2.53/MMBTU. This price translates to RLNG price of \$3.63/MMBTU ex-Dahej terminal. The price would vary on monthly basis from January 2009. Further, in July 2007, PLL has signed another contract with RasGas, Qatar for supply of 1.25 MMTPA LNG from July 2007 to September 2009 to meet the requirement of Ratnagiri Power Project in Maharashtra.

In order to make the price of spot RLNG affordable, EGoM has decided in the meeting held on January 11th 2007 for pooling of prices of spot cargoes with LNG being imported on term contract basis. This Ministry accordingly issued orders on March 6th 2007 in compliance with the decision of EGoM. In addition to the above term contracts, LNG is also being



sourced from spot market by PLL and Hazira LNG Pvt. Ltd. During 2007-08, an average quantity of about 5.7 MMSCMD was brought into the country as spot cargos.

**Table 3: Summary of Prices prevailing across India**

Gas Source	Price (\$/MMBTU)	Gas Source	Price (\$/MMBTU)
PMT RRVUNL	4.60	APM North East at market price	1.79
PMT Torrent	4.75	APM Power	1.79
PMT others	5.65	APM Fertilizer	1.79
Rava	3.50	APM City Gas	2.15
Rava Satellite	4.30	CB/OS -2 Cairn GPEC	4.75
KG D6	4.20	CB/OS - 2 Cairn GTCL	4.60
APM North East-	1.08	Olpad (NSA) Niko	5.50

Gas Source	Price (\$/MMBTU)	Gas Source	Price (\$/MMBTU)
Power and Fertilizer			
APM North East- City Gas	1.29	North Balol (HOEC)	1.77
CB/OS -2 Cairn GSPC	5.50	*Dahej Term LNG	5.42
Hazira Niko- AGCL	4.61	Palej (HOEC)	3.50
Dholka	1.77		

(Source: GAIL, MoPNG)

MoPNG also allowed ONGC and OIL to market gas produced by them at market rates. ONGC was given permission to sell gas from its C-series fields in Mumbai offshore at USD 5.25/MBtu, even higher than KG-D6. These fields are expected to produce 1 BCM/y. On top of gas produced domestically, LNG has become an increasing part of the supply mix of India. The current LNG prices for the two operating terminals are the following:

**Long-term contract with Qatar’s RasGas (Dahej)**

For the first five years, Petronet paid a fixed-price agreed in the contract (USD 2.53/MBtu for 5 mtpa). In January 2009, this price was raised to USD 3.12/MBtu while volumes increased to 7.5 mtpa in Q4 2009.

**Short-term contracts**

Petronet negotiated with RasGas until December 2008 for 1.5 mtpa, Petronet paid USD 8.50/MBtu, but the price for end-consumers was pooled with the USD 2.53/MBtu Petronet paid for LNG under the long-term contract.

**Spot cargoes**

During the summer of 2009, several companies including Petronet and GAIL contracted spot cargoes for Dahej. Delivered prices were at USD 4.50-4.75/MBtu. Similar prices were observed for Hazira, a sharp drop compared to the cargos imported in October 2008 at USD 2022/MBtu.

Petronet’s terminal in Kochi to be commissioned by 2012 has contracted to receive LNG from Exxon Mobil’s 25% stake in Australia’s Gorgon project in all likelihood at much higher prices than existing LNG contracts. LNG supplies will start in 2014-15. The previous wide disparity between APM prices and non-APM prices, whether for gas from pre-NELP or NELP, has narrowed. Under long-term contract, LNG is at a middle point between APM and non-APM prices but gas sold under the new long-term contracts is likely to be more expensive. Spot LNG prices are usually the highest but depend on global market conditions: they were effectively at the same level as non-APM prices during the summer of 2009 (see Table 4).

**Table 4: Gas Price Differentiation in Indian Market (2010)**

Gas source	Import or production price
OIL	USD 4.2/MBtu (APM regime) (USD 1.8 up to May 2010)
ONGC	USD 4.2/MBtu (APM regime) (USD 1.8 up to May 2010)
LNG long-term contract	USD 3.12/MBtu, Dahej terminal
RIL	USD 4.215/MBtu
C Fields	USD 5.25/MBtu
Panna Mukta Tapti field	USD 5.73/MBtu
LNG spot	USD 5-6/MBtu mid 2010 but has been ranging between USD 4.75 and 20/MBtu in the period from October 2008 to mid 2010

Note: The end-user delivery price would include a transportation price.

(Source: IEA, Indian Oil and Gas, Industry announcement and presentations)

**Pricing Issues**

The pricing issue in India has always been quite complex. Firstly, APM gas supplies have been declining while non-APM gas saw a dramatic increase in volume and share. Furthermore, APM gas has been allocated in priority to power producers and fertilisers, two sectors expected to see their demand increasing over the coming decade. While the Ministry of Petroleum and Natural Gas has been pushing for higher prices to limit losses from the PSU, this has met with strong resistance from the Ministry of Power and Ministry of Chemicals and Fertilisers. The subsidies to fertilisers have already multiplied by five over the last five years to reach INR 75 849 crore (USD 16.6 billion) in 2008/09.

## **Supply Side Issue**

From the supply side, keeping artificially low APM prices often sends the wrong signals: indeed, gas prices have to be high enough in order to attract upstream investments, and cover production costs and the recovery of capital in order to limit under-recoveries from PSUs (the difference between the international market prices and the domestic retail price). These, unsurprisingly, complained that low prices had been resulting in substantial losses for them.

Furthermore, India is likely to need increasing LNG supplies and has to be able to contract additional LNG supplies on global markets or spot LNG cargoes when these are available to meet a growing supply-demand gap. Even if the slope in long-term contracts is no longer at the 0.17 seen in the Asian region in 2008, it is certainly likely to result in higher prices than the USD 3/MBtu price with Qatar.

## **Demand Side Issue**

On the demand side, the challenge is to perform a transition to prices closer to market prices while maintaining the consumer's competitiveness. KG-D6 gas price for the first five years of production, namely USD 4.21/MBtu, will soon represent around half of India's supplies. This price, more than twice the former APM price level fixed by the government, has unsurprisingly become a reference point. Being a private sector company, RIL cannot sell gas at under cost; therefore their clients have to be able to pay cost-plus for any of their gas. Indeed gas availability and affordability for customers are crucial for gas development in India. Demand for gas is infinite at USD 2-3/MBtu but limited at USD 7-8/MBtu for Indian major, priority customers – fertiliser production and power generation.

There are two direct competing fuels for gas in these two sectors: Coal (in the power sector) and Naphtha, as well as the option to produce fertilisers offshore. Gas represents currently a small portion of total power capacity. In most cases, coal-fired generation will be cheaper than gas, but when one compares a coal-fired plant is located far from coal fields or using imported coal with a gas-fired plant near the existing gas transmission infrastructure, this will not be the case. Certainly, these two sectors will be tested by the increase of APM prices. The fertiliser industry represents a big issue as increasing the gas price is likely require some policy solution: this could be increasing the subsidies of these customers, something that the finance ministry is unlikely to accept easily, or produce fertiliser in other countries which would face opposition from the fertiliser producers themselves and would also affect India's self sufficiency with respect to agricultural production.

## **Road Ahead**

There have been many attempts undertaken by Indian governments to liberalise/revise the dual system until the decision was taken in May 2010. Several suggestions had been made: one was to increase the price paid to ONGC and OIL to USD 2.3/MBtu in 2010, to link it to a

Wholesale Price Index in the future, or to increase it progressively to USD 4.2/MBtu by 2013. Another idea developed by the Ministry was a uniform domestic price instead of a multitude of prices. This would be achieved through a removal of the dual APM/market pricing by gas pooling, which should stabilise prices and thus serve as a benchmark.

The government has made a big leap forward by increasing APM prices directly to USD 4.2/MBtu, creating a reference price representing currently to an estimated two thirds of gas supplies. Additional changes may happen. The idea of pooling gas prices is still under study. The question is now to see how this will affect the market in the future and how gas users, which had been allocated cheaper gas than the new reference price, will be adversely affected. Whatever the choice, a new future pricing mechanism would need to incentivise gas production, attract new LNG supplies, while being transparent to attract foreign or private investors.

## **Framework of New Pool Pricing Mechanism**

### **Need for Pool Pricing**

The Indian gas market needs to match customer expectations, gas infrastructure expansion with providing flexibility for new and marginal suppliers to enter the market. Price pooling is a mechanism where the potential for balancing the customer and developer expectation with that of suppliers.

The need and benefits of pooling for the Indian gas markets need to be considered in the context of the market development objectives. These could be summarised as follows:

1. Introducing new gas sources in the market;
2. Ensuring stable price signals for long gestation investments based on gas;
3. Deepening the pipeline network to expand the gas markets geographically;
4. Sending appropriate price signals for efficient use of gas;

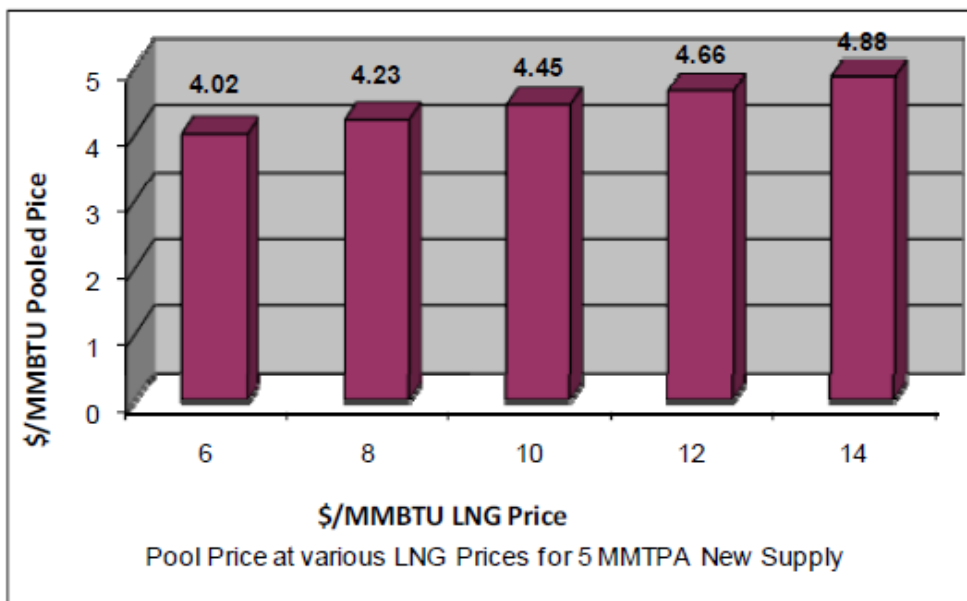
The Indian gas markets are relatively small as compared to the size of the economy, but are expanding rapidly. However, as commented earlier, the expansion has not kept pace with the demand. Domestic gas finds, while substantial, are inadequate to meet the burgeoning demand for gas. In particular, the demand from bulk consuming sectors like power and fertiliser is growing at a rapid pace. At the other end, the demand from city gas is also expected to increase rapidly in the coming years. As a result of this expansion of demand, the country is looking seriously at LNG as a potential source of supply expansion.

LNG, as an internationally traded commodity presents two challenges. Firstly, the price of LNG is generally linked to the price of crude oil, especially for long term supplies. The resultant prices of RLNG are typically significantly higher than the prices of domestic gas,

including from the NELP fields. Secondly, the prices of such supplies being linked to crude are inherently volatile. The combination of relatively high prices and high volatility make it difficult for user industries like power and fertiliser to plan investments based on LNG.

Price pooling can serve the objectives of introducing substantial quantities of new LNG supplies. The existing base of the pool would serve to reduce the price volatility, and given the impetus for infrastructure development. The graphic below illustrates the impact of 5 MMTPA of new LNG supplies (approximately adequate for 5000 MW of new power projects), on the existing cost pool in India, at various supply price points.

**Figure 1: Pool Price at Various LNG Prices for 5MMTPA New Supply**



(Source: Report on Common Pool Pricing 2010, MoPNG)

**Proposed Roadmap of Pool Pricing Mechanism**

The pooling options have been broadly divided into two major categories viz. Cost Based pool and Bid Based pool. Cost based pool has been further divided into General pool and Sectoral pool. The following section defines the various pools considered for this study.

**General Pool**

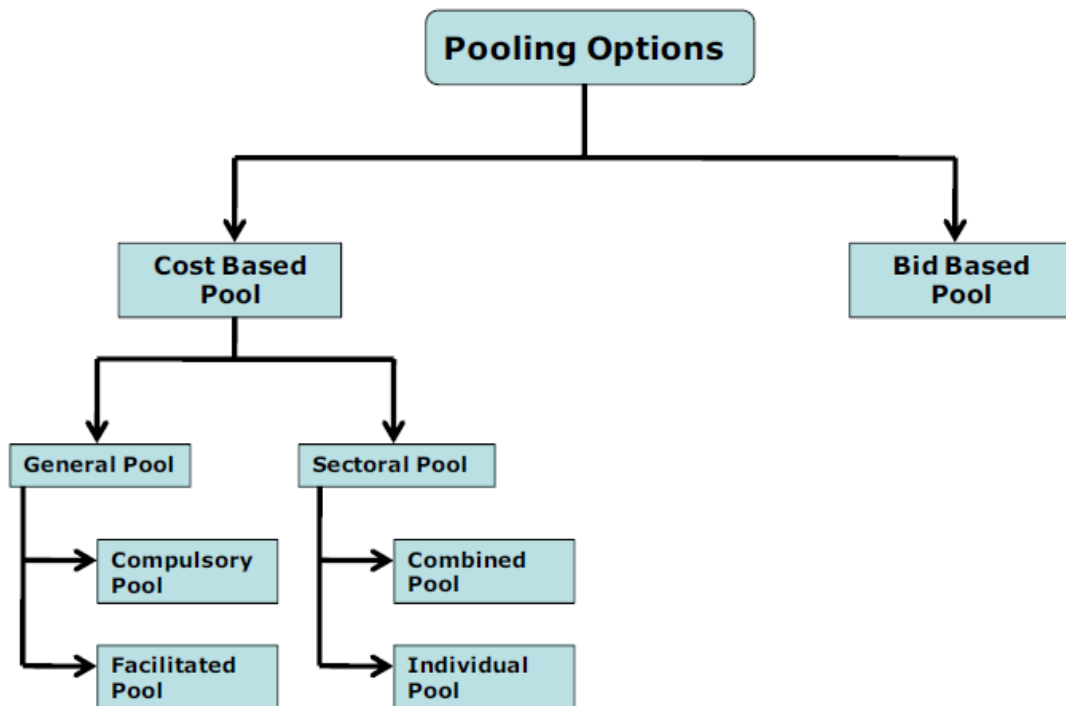
In this type of pooling arrangement all the gas producers or traders participate in the pool. Gas is supplied to all the customers through the pool administrators. This could feature two basic options as variants.

- (i) Mandatory or compulsory pool - In mandatory pool all the gas producers or traders have to participate in the pool and subsequently all the sale of gas will

happen through the pool. Similarly, all demand would be required to contract through the pool for supplies.

- (ii) Facilitated pool - Facilitated pool does not make it compulsory for the gas producers or gas suppliers to participate in the pool. The gas producers or traders can participate in the pool and exit from the pool as per the defined rules of the pool. The same would apply for buyers from the pool.

**Figure 2: Pooling Options in India**



*(Source: Report on Common Pool Pricing 2010, MoPNG)*

**Sectoral Pool**

Sectoral pool is specifically for pre-identified sectors. As regards this study, this has been considered for Power and Fertilizer segments, although variants could extend to other sectors as well. Two basic forms of sectoral pools have been considered.

- (i) Combined pool - In combined pooling arrangement there is a single pool for Power and Fertilizer. The gas at pooled price is supplied to customers from both the sectors through an identified mechanism.

- (ii) Individual pool - In this type of pooling arrangement there will be two different pools for Power and Fertilizer separately. The pool operator may or may not be the same. The gas at the pooled price is supplied to the respective customers through an identified mechanism. The pooled price may or may not be the same for both the pools.

The above options have been discussed in the subsequent sections. It needs to be noted that in all options presented herein, the existing cost structures of the gas supply from producers (or importers) remain unchanged, and the revenues to be generated would correspond to these costs, plus the transportation costs, taxes and duties as at present. Hence there is no impact on subsidies as a whole, although the cost of gas to individual consumer costs would be rationalised as a result of the pooling arrangements. In subsequent years, with expansion of supplies in the pool, this would be altered based on the cost and quantum of additional gas supplies. Hence, irrespective of the option selected, specific pool rules would need to be agreed on the cost and quantity limits and implemented by the pool operator accordingly.

### **Conclusion**

In 2010, the Indian gas market is nevertheless at a crossroads. Despite the dramatic increase of domestic production, substantial issues remain which will have to be solved for the Indian gas market to reach its potential. Two major issues have been analysed within this Working Paper: Regulation/Policy and Pricing.

The issues regarding policy are probably the most important: India needs a clear policy and regulatory framework in order to attract the investments needed in the energy sector, not only to sustain a high economic growth, but also to deal with poverty which leaves millions of people without access to energy. The role and powers of the regulators have to be clearly defined. India has opened up to private and foreign companies and these want regulatory stability with minimum intervention from the state. The government has reduced the gap between very cheap APM gas and more expensive other supplies. The dual system had indeed proven its shortcomings, which were increasingly visible as APM gas volume and share in total supplies diminished. Keeping low energy prices was not only a disincentive for upstream investment, resulting in losses for PSUs, but also discouraged investments in energy efficiency on the demand side. In the long term, additional LNG supplies are likely to be needed, but would also be more expensive than the current price paid for Qatari LNG. If India wants to attract additional LNG in the long term, it will have to increasingly compete in global gas markets at prices potentially higher than the current ones; otherwise LNG supplies will be taken by other Asian markets such as China. Pricing is also a key factor for the demand side due to some sectors' sensitivity to gas prices: gas-fired plants must compete with coal-fired plants which are usually more competitive. However, in some cases gas-fired plants near production sources or import terminals could be more competitive than coal-fired plants, especially those using imported coal or domestic coal shipped over long distances. Gas use for fertiliser production depends on government policy towards dependency on other

countries and subsidies, as fertilisers can be produced at a cheaper price in nearby Middle Eastern countries.

Pricing will determine the balancing point between supply and demand. There have been some positive developments in the upstream sector resulting in an increasing participation of JV and private companies and a certain number of discoveries including Krishna Godavari KG-D6, but the NELP is also facing some shortcomings mainly linked to policy and pricing issues. India remains largely under-explored and major efforts have to be made in this respect to develop additional domestic supplies. Although India is also located near significant resources of gas in Turkmenistan and Iran, pipeline interconnections remain a distant prospect. India has been turning to LNG instead and is building new regasification terminals, which will increase the existing capacity by half. Future supplies in the coming five years will be therefore based on two sources: domestic production and LNG supplies.



## **References:**

### **Websites**

<http://petroleum.nic.in/ng.htm>

<http://www.commodityonline.com/commodities/energy/naturalgas.php>

<http://www.eia.doe.gov/cabs/India/NaturalGas.html>

<http://energy.einnews.com/news/india-natural-gas-prices>

<http://www.iea.org/>

<http://omrpublic.iea.org/>

[http://pesd.stanford.edu/publications/india\\_gas\\_synth/](http://pesd.stanford.edu/publications/india_gas_synth/)

[http://en.wikipedia.org/wiki/Compressed\\_natural\\_gas](http://en.wikipedia.org/wiki/Compressed_natural_gas)

### **Reports**

**Report on Common Pool Pricing** by Mercados Energy Market International and GAIL

**Natural Gas in India** by IEA